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ARGUMENT SHARING IN RESULTATIVE CONSTRUCTIONS*

1 INTRODUCTION

In this paper, I will discuss "argument sharing phenomena" observed in English resultatives and Edo resultatives. English resultatives have attracted considerable attention in the linguistic literature because of their peculiar property, in particular their syntax-semantic mismatch. I will examine by assuming argument sharing. I suggest that the theme argument in resultatives can be shared by more than one predicate. This suggestion may be incompatible with the Projection Principle. However, we don't need to preserve this principle, because in the Minimalist Framework the principle is not thought to be necessary because of the single-level syntactic derivation. This suggestion is also inharmonious with θ-criterion, which suggests that each argument bear only one θ-role. However, as discussed in Borer (1980), one of the major drives to force the assumption of this criterion and the Projection Principle is to ban the movement to a landing site where θ-roles are assigned to prevent ill-formed sentences from being generated, which suggestion is inherited from the Structure Preserving Constraint suggested by Emonds (1976). I do not assume this kind of movement to a position in which θ-roles are assigned. Rather, I suggest that one argument can be shared by more than one predicate in its base-generated position. In addition, Hoekstra (1984) suggests that θ-criterion is not put to use in syntactic descriptions. Therefore, we do not need to defend θ-criterion and the Projection Principle. The evidence for argument sharing can also be found in the serial verb constructions (SVCs) in Edo resultatives. I will analyze this construction and suggest that SVCs in these examples will support my argument sharing analysis. I argue that the double-headed phrase structure, which is suggested in Baker (1989) or Baker and Stewart (1999), is not needed if we assume an argument sharing analysis in Edo resultatives.

If this analysis is on the right track, we can still handle resultatives within a

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syntactic perspective and it can be said that the argument selection of verbs must be determined by syntax. Rappaport and Levin (2001) discuss resultatives within event-structural perspective (cf. Goldberg (1995)), and suggest that the syntactic treatment of resultatives cannot be carried out based on the fact that the Direct Object Restriction (DOR) is inadequate. However, I will explore the possibility that the syntactic analysis is still attainable though the DOR is not assumed.

The organization of the paper is as follows. Section 2 of this paper investigates English Resultatives, and section 3 is the syntactic analysis of these phenomena. Section 4 is the discussion of Edo resultatives and section 5 is the conclusion.

2 PROPERTIES OF ENGLISH RESULTATIVES

Resultatives in English have been given extensive discussion in the literature. English resultatives have not only a fixed syntax, but they have various curious properties. Typically in English resultatives a matrix verb is followed by a noun phrase and a result expression, which predicates the preceding noun phrase. [1] In addition, the subject of the result phrase must occur in the immediate post-verbal position, i.e. occupy the "direct object" position as shown in (1). Following Levin and Rappaport-Hovav (1995), I will call this restriction the Direct Object Restriction (DOR).[2] In addition, there is a thematic relationship between the matrix verb and the result phrase, that is, the result state is caused by the activity denoted in the matrix verb. For example, the sentence (1a) can be paraphrased as "The tulips became flat by watering them." Transitive-based resultatives are shown below:

(1) a. The gardener watered the tulips flat.
b. The grocer grounded the coffee beans into a fine powder.
c. They painted their house a hideous shade of green.
d. They broke the window into pieces.

(Carrier and Randall 1992)

All these matrix verbs are transitive verbs and the post-verbal NPs are subcategorized arguments, because even if the result expressions are deleted, these sentences are grammatical, as shown in the following examples:

(2) a. The gardener watered the tulips.
b. The grocer ground the coffee beans.

[1] These days many linguists use a determiner phrase, not a noun phrase. I simply use the term "noun phrase" in this paper for expository purpose.

[2] Levin and Rappaport (2001) suggest that the DOR is inadequate to describe the nature of resultatives, and the syntactic analysis of resultatives cannot be carried out because the basis for syntactic investigation depends on it. Their main claim against the DOR focuses on the result phrases, which predicate the main subjects. For a detailed discussion, see Levin and Rappaport (2001).

c. They painted their house.
d. They broke the window.

On the other hand, even unergative verbs, which normally do not take any internal arguments, take post-verbal NPs in resultatives. Moreover, some transitive verbs can compose resultatives when followed by unusual objects, that is, the expected objects are often suppressed as shown in (3e). The examples in (3a-d) denote various subtypes of the unergative-based resultatives whose post-verbal NPs are a fake reflexive, an inalienable possession and an independent NP:

(3) a. The kids shouted themselves hoarse.
b. Mike danced himself tired.
c. The craftsman worked his fingers to the bone.
d. He ran the pavement thin.
e. They drank the teapot dry.

All these post-verbal NPs are not subcategorized arguments of the matrix verbs, because these sentences are ungrammatical without the result expressions:

(4) a. *The kids shouted themselves.
b. *Mike danced himself.
c. *The craftsman worked his fingers.
d. *He ran the pavement.
e. *They drank the teapot.

Moreover, the sentences in (3a) and (3b), which have a "fake object" as the subject of the result phrase, will be ungrammatical if these fake objects are deleted as shown in the following examples:

(5) a. *The kids shouted hoarse.
b. *Mike danced tired.

If we adopt the normal prospect that unergative verbs are not case-assigners, there still remains an obvious question how the non-subcategorized NPs are assigned case. I will discuss this problem in the following section.

As pointed out by Carrier and Randall (1992) or Levin and Rappaport-Hovav (1995), resultatives with post-verbal NPs do not occur with unaccusative verbs:

(6) a. The pond froze solid.
b. *The pond froze the fish dead.
c. The bottle broke open.
d. *The bottle broke the edge open.

Unaccusative verbs can be followed by a result phrase, but do not take post-verbal NPs. Following the Unaccusative Hypothesis (Rosen (1981), Burzio (1986), Levin and Rappaport Hovav (1995)), which states that the subject of unaccusative verbs

base-generates in the complement position of the verb, unaccusative verbs can be said to take one underlyingly internal argument raised to the Spec-TP. The theme argument is predicated by both the matrix verb and the result phrase. In addition, there is a thematic relationship between the matrix verb and the result phrase, i.e. the result state is caused by the event denoted by the matrix verb. The following examples illustrate the thematic restriction on the result predicates:

(7) a. *The lake froze beautiful.
b. *The lake froze transparent.
c. *The bottle broke beautiful.
d. *The bottle broke transparent.

We can say that "The lake is beautiful and it froze," or "The lake is transparent and froze," because the coordinated structure does not have a thematic restriction between the predicates. The sentence in (7a) illustrates the semantic constraint between the VP *froze* and the AP *beautiful*, which causes this sentence to be unacceptable.

To sum up this section, there are three types of resultatives according to verb classes in English. The first are transitive-based resultatives, which take a subcategorized argument in the post-verbal position followed by the result phrase. The second are unergative-based resultatives and some transitive-based resultatives, which take a non-subcategorized argument in the direct object position. The last are unaccusative-based resultatives, which take a result phrase but are not followed by the post-verbal NPs. All these resultatives have a thematic connection between the matrix verb and the result phrase, i.e. the state denoted by the result phrase is caused by the event described by the matrix verb. I will discuss the syntactic characteristics of English resultatives and the semantic relationship between the matrix verb and the result phrase in the following section.

3 SYNTACTIC ANALYSIS

In this section, I discuss the syntactic structure of resultatives. There have been many proposals about the syntax of resultatives in Simpson (1983), Kayne (1985), Hoekstra (1988), Carrier and Randall (1992), Levin and Rappaport Hovav (1995) and others. In this section I argue for the syntax of resultatives by using the VP Shell analysis introduced in Larson (1988), Hale and Kayser (1993), and Chomsky (1995). Let us assume that there are three syntactic structures with respect to predicate types. Following the standard assumption that the VP structure in English consists of two elements v and V, let us assume that v takes VP as its complement. Roughly speaking, v denotes the causative meaning and takes the external argument as its agent, while V expresses the state or transition. Transitive verbs take both v and V, unergative verbs v and part V, and unaccusative verbs only V. Thus, transitive verbs take both internal and external arguments as their lexical property. In most cases, unergative verbs take external arguments but do not need internal arguments, with the exception of cognate objects or other peculiar phenomena. The peculiarity of unergative verbs is that they

have room to take internal arguments in their complement position, which makes it possible to generate the post-verbal NPs in resultatives. This is in accord with Burzio's generalization. On the other hand, unaccusative verbs take internal arguments in their subject position. Following the Unaccusative Hypothesis, I assume this internal argument is raised from the complement position of unaccusative verbs to the Spec-TP to check nominative case and EPP feature. This phenomenon can be captured by the impossibility of generating post-verbal NPs in unaccusative-based resultatives. If this suggestion is on the right track, it can be said that unaccusative verbs appear derivationally and we do not need to assume the lexical formation of unaccusative verbs. I will discuss this fact in detail in the last part of this section.

In this paper, I follow the theory of AGREE proposeed by Chomsky (2000, 2001) for the syntactic feature-checking mechanism. The theory of AGREE has produced more conceptually desirable effects than the theory of feature movement. In this theory, feature-checking operation is conducted under AGREE and Matching of features. Thus uninterpretable features of a probe P and a goal G are erased under the structural condition (8) and the Matching Condition (9). AGREE is established where a probe P and a goal G have a c-command relation and uninterpretable features of P and G are checked under the Matching of features.

(8) AGREE: P>G
> is a c-command relation.

(9) a. Matching is feature identity.
b. The domain D (P) is the sister of probe P.
c. Locality reduces to "closest c-command." (Chomsky 2000: 122)

3.1. Transitive-based and Unergative-based Resultatives

In transitive-based resultatives, there is no crucial difference in the VP between resultatives and their normal cases, but in unergative-based resultatives, I stipulate a syntactic operation "Result Raising." One reason for this stipulation is that in transitive-based resultatives the post-verbal NPs are subcategorized arguments of their matrix verbs as discussed in (1) and (2), so these post-verbal NPs should be generated in the same position as their regular cases. Another reason is that in unergative-based resultatives as well as the suppressed object types like in (3e) the post-verbal NPs are not the original arguments as shown in (4e). The syntactic structure of transitive-based resultatives is illustrated below:

(10) $[_{TP}$ The gardener $[_{T'}$ $[_{vP}$ $[_{VP}$ watered $[_{DP}$ the tulips$_i$$][_{AP}$ PRO$_i$ flat]]]]
NOM/ [Φ] [Φ] [Φ] ACC/[Φ]

The post-verbal NP *the tulips*, base-generates at the complement position of the matrix verb *watered.* Thus the NP *the tulips* is interpreted as the theme of this verb. The NP *the tulips* appears in the complement of the VP even if the matrix verb

watered is not used as a resultative, because this NP is the subcategorized argument of the matrix verb irrespective of its uses, so there should not be any difference in the structure between depictive readings and resultative readings. The Φ-feature of *v* Agrees with the Φ-feature in the NP *the tulips*, and the uninterpretable features are correctly deleted under the Matching of features. The NP *the tulips* are assigned the accusative case, because its matching probe is *v*. The NP *the gardener* is Agreed with the probe T and assigned the nominative case, because its matching probe is T. The NP *the gardener* is moved to Spec-TP to check EPP, and the derivation converses.[3]

The adjective *flat* predicates the PRO, which is controlled by the NP *the tulips*, and in this sense the argument *the tulips* is indirectly shared by the matrix verb *watered* and the adjective *flat*. Thus the semantic restriction between the matrix verb and the result phrase is established, because these two predicates are indirectly compounded thorough this semantic relation.[4]

Let us turn to unergative-based resultatives. The crucial difference between transitive-based resultatives and unergative-based resultatives is that in the latter there is a Raising-to-object operation discussed by Postal (1974), Pesetsky (1995) and Chomsky (1995), while transitive-based resultatives do not have such an operation:

(11) $[_{TP}$ The kids $[_{T'}$ $[_{vP}$ $[_{VP}$ shouted $[_{DP}$ themselves$]_i[_{AP}$ t_i hoarse$]]]]]$
NOM/[Φ] [Φ] [Φ] ACC/[Φ]

The structural difference between (10) and (11) is that in (11) the post-verbal NP *themselves* is raised to the complement position of unergative verbs by "Result Raising," which means a raising to object position. Unergative verbs, which are not case-assigners in most cases, can be turned into a transitive-verb-like status, because the complement position of unergative verbs is not occupied by any element and leaves a space for some elements to appear. This phenomenon is known as "Burzio's Generalization," which suggests that the verb taking external arguments take complements. Thus the *v* in unergative verbs can have Φ-feature and this Φ-feature Agrees with the NP *themselves* in (11) and the derivation correctly converses.

The theme NP *themselves* get a θ-role from the AP *hoarse*, and then raises to the complement of the *v*P shouted. Following Hornstein's (2000) analysis for the reflexive as a working hypothesis, let us assume the local anaphor *themselves* is formed by movement operation. Thus the NP *themselves* is a copy of its antecedent *the kids*, and in this sense the NP *themselves* indirectly shares two predicates *shouted* and *hoarse*, and the semantic relation between the predicates is composed.

As for the lexical nature, the transition in the lexical property of unergative verbs

[3] In the Minimalist Inquiry's framework for the movement operation it is assumed that the moved phrase must Agree with the attractor, pied-pipe to the landing site, and leaves a copy in its original position. In fact, the NP the gardener may base-generate within the *v*P phrase under the VP-Internal Subject Hypothesis by Fukui (1986), Kuroda (1988) or Koopman and Sportiche (1991). I leave this issue undeveloped here because it is not relevant in this discussion.

[4] Wechsler (1997) and Levin and Rapparport (2001) discuss the subject oriented resultatives with transitive verbs, in which the result phrase predicates the main subject, not a post-verbal NP. Based on this fact, Levin and Rappaport suggest that the DOR is not adequate and so the syntactic analysis of resultatives cannot be attained. However, if the suggestion in this paper is on the right track, their examples are simply subject-control cases, and the syntactic analysis can be accomplished.

to transitive verbs, which subcategorizes for a single object position, latently updates an oblique object to a direct object-like status as discussed in Jackendoff (1990) below:

(12) a. The professor talked (*to) us into a stupor.
b. His friend laughed (*at) Bill out of town.
c. Bill shaved (*with) his razor dull. (Jackendoff 1990: 227)

We must pay attention to the fact that the lexical transition of unergative verbs to transitive verbs is a syntactic phenomenon, not a lexical operation, that is, Result Raising is a syntactic operation and the lexical formational rule cannot be preserved here, because if we assume that lexical formation occurs in the lexicon, which is thought to work before the syntactic operation, it can be expected that the noun phrases based on the unergative-based resultatives can be generated. In fact, this expectation cannot be borne out, as shown below:

(13) a. *the kid's shout of themselves hoarse
b. * Mike's dance of himself tired
c. * the craftsman's work of his fingers to the bone
d. * his run of the pavement thin

These examples illustrate unergative-based resultatives are possible iff the small v of unergative verbs are activated to turn to transitive verbs in a syntactic derivation, and they may shed light on the theory of verbal lexicon. If the argument selection of verbs must be determined in the lexicon, this situation cannot be predicted, because unergative verbs, which usually do not take internal arguments, can do so in resultatives. Raising operation clearly occurs in the syntax, so through the analysis of resultatives we can say that the argument selection of verbs must be formalized in the syntax, not in the lexicon.

The reason why the post-verbal NPs are raised to the object position of unergative verbs is that unergative verbs in the case of resultatives can check the accusative case because they have external arguments and can check the accusative case following Burzio's generalization. Hence the accusative case of post-verbal NPs can be checked in unergative-based resultatives, because the matrix unergative verbs can check the accusative case by the activation of unergative verbs to take VP, and I have called this raising operation Result Raising. The raising operation in unergative-based resultatives produces some interesting predictions. In transitive-based resultatives both resultative reading and depictive reading can be captured, because in transitive-based resultatives there is no difference concerning the behavior of post-verbal NPs between the two interpretations. On the other hand, in unergative-based resultatives, the raising of NPs is required for the matrix Verb to take post-verbal NPs, so in an unergative case only a resultative reading can be obtained when they are followed by the post-verbal NPs. The evidence for this phenomenon is illustrated below from examples by Carrier and Randall (1992) and Kim and Maling (1997):

(14) Transitive verb
a. The lioness chewed his knuckles raw.
(i) resultative: his knuckles became raw
(ii) depictive: his knuckles were already raw
Unergative with fake reflexive
b. She laughed herself silly.
(i) resultative: she became silly
(ii) *depictive: she was already silly
Oblique object
c. Bill shaved his razor dull.
(i) resultative: the razor became dull
(ii) *depictive: the razor was already dull

(Kim and Maling 1997: 202)

These examples correctly illustrate the existence of Result Raising, because the unergative-based resultatives only generate resultative reading via Result Raising, and do not generate depictive reading in this form.

3.2. Unaccusative-based Resultatives and Passive-based Resultatives

In this section I will consider resultatives with unaccusative verbs. As I have pointed out in the section 2, unaccusative-based resultatives do not take post-verbal NPs. This phenomenon can be grasped if we assume the Unaccusative Hypothesis, which suggests the argument of unaccusative verbs base-generates at the complement position of unaccusative verbs and then are raised to Spec-TP. I introduce a locality condition called Defective Intervention Constraint (DIC) suggested by Chomsky (2000). DIC regulates that if the probe and the goal are intervened by a closer and inactive goal, the establishment of AGREE is prohibited, as shown below:

(15) The Defective Intervention Constraints
$\alpha > \beta > \gamma$: AGREE (α , γ) is prohibited if α is a probe and β is a matching goal, and β is inactive due to the prior AGREE with some other probe other than α . > is a c-command relation. α c-commands β , β c-commands γ , and α c-commands β .

(Chomsky 2000: 123)

With these assumptions in mind, let us turn to the syntactic derivation of unaccusative-based resultatives shown below:

(16) $[_{TP}$ The lake$_i$ $[_{T'}$ $[_{VP}$ froze $[_{DP}$ t_i] $[_{AP}$ solid]]]]
NOM/[Φ] [Φ]

In this derivation the NP *the lake* base-generates at the complement position of the

unaccusative verb *froze*, and then is raised to the Spec-TP. The Φ-feature at T Agrees with the Φ-feature in the NP *the lake*, so the copy/trace of *the lake* is turned into an inactive goal by this Agree operation. *The lake* is assigned nominative case, because its matching feature is in the T and *the lake* checks EPP at Spec-TP by the raising operation. Since the verb *froze* is an unaccusative verb, it does not have *v* or uninterpretable Φ-feature in V. Thus there do not remain uninterpretable features, and this derivation converges.

On the semantic side, the NP *the lake* gets two θ-roles from the AP *solid* and the matrix verb *froze* in its base-position to constitute a semantic relation between the predicates, that is, the argument *the lake* is shared by the two predicates. I will call this semantic relation produced by argument sharing "Semantic Link." In this example, the result state *solid* forms a semantic link through argument sharing with the matrix verb *froze*, and this semantic relation is assured at LF to produce resultative reading.

(17) Semantic Link through argument sharing
If more than one predicate shares an argument, there must be some semantic relation between the predicates. They are semantically dependent on each other.

Hence the sentence can be paraphrased as "The lake froze and it became solid." The argument *the lake* is shared by the two predicates in this sentence and I will discuss other examples of argument sharing in Edo in the following section. This analysis is in accord with the observation by Rappaport and Levin (2001), which state that resultatives followed by post-verbal NP can have a complex event reading, while resultatives without post-verbal NP cannot. In the latter case, the argument is directly shared by the main predicate and the result predicate to constitute a semantic link and produce a single event reading. On the other hand, the semantic relation in the former case between the main predicate and the result predicate is indirect and a single event reading is not required.

As is suggested, we can easily describe the fact that the unaccusative-based resultatives do not take any post-verbal NPs under DIC. The inactive goal, the copy/trace of *the lake* remains in a closer position to the probe T than some goal as illustrated in the ungrammatical example below:

(18) * [$_{TP}$ The lake$_i$ [$_{T'}$ [$_{VP}$ froze [$_{DP}$ t_i] [$_{AP}$ [$_{NP}$ the surface] solid]]]]
[Φ] [Φ] [Φ]

In this configuration, the inactive goal, the copy/trace of *the lake* c-commands the NP *the surface* and is closer to T than the NP *the surface*. Thus the intervened trace prevents the establishment of AGREE between the probe T and the goal *the surface*. Hence DIC correctly captures the unavailability of post-verbal NPs in unaccusative-based resultatives.

The same picture emerges in the case of passive-based resultatives. It can be predicted that transitive verbs in their passive forms do not take post-verbal NPs,

because the matrix subject of passives base-generates at the complement position of the verb, and leaves its copy, or trace, which will trigger DIC, as in the case of unaccusative-based resultatives:

(19) a. The table$_i$ was wiped t_i clean.
b. The metal$_i$ was pounded t_i flat.
c. * The table$_i$ was wiped t_i the surface clean.
d. * The metal$_i$ was pounded t_i the edge flat.

This fact again supports the claim that the argument selection of verbs must be determined in the syntax, because passive movement is thought to be a typical syntactic operation since the early days of generative grammar. In fact, we cannot insist that all argument selections of verbs must be determined syntactically from the above examples, but they suggest that some argument selection of verbs be determined syntactically. Clearly the copy/trace or the DIC is not available in the lexicon, because the trace/copy is a product of syntactic movement operation. Here we have the chance to abandon the lexical formational rule suggested in the Lexical Semantic analysis by Jackendoff (1990), Kageyama (1993), Levin and Rappaport (1995) or others. If we grasp various phenomena previously discussed within the Lexical Semantic framework through the syntactic treatment, we may as well withdraw from the lexical formational rule due to its redundancy. The truth is that it might be possible to cast aside the syntactic operation but to adopt the lexical semantic framework. However, this is just a tautology, because it just picks up an alternative, and there is not a fundamental difference between the two options. If we have a choice to select the syntax or the lexical formation, it may be desirable to take the syntax because of the simplicity. If we dispense with the lexical formational rule, conceptual problems will not occur, or rather it will lead to the simplification of the theory. On the other hand, we cannot abandon the syntactic operation, simply because there is no language which is free from syntactic operation. Thus if we have an option to select either the syntax or the lexical formational rule, we might as well choose the syntax. From the conceptual point of view, I do think that the lexical information should be restricted to the elements which are only available before the syntactic operation. Therefore, I argue that the redundant lexical formational rule be abandoned but do not suggest that all lexical information be abandoned. In fact, some elements, which are not available in the syntax, must be included in the lexicon.

Another problem is whether a movement operation like Result Raising or the Unaccusative Hypothesis is valid. These movement operations will violate the Projection Principle, which suggests that all semantic relations between arguments and predicates must be observed throughout the derivation from D-structure to LF. In fact, we do not need to worry if the analysis here does not preserve the Projection Principle, simply because in the Minimalist Framework the multiple syntactic levels are no longer assumed. In addition, the important motivation, which assures the Projection Principle, prevents the movement to a θ-position, and both Result Raising and the Unaccusative Hypothesis do not assume the movement operation to a θ-position. The complement position of unergative verbs is the one in which case is assigned but θ-role is not. The specifier position of unaccusative verbs is also the one

where case is assigned but θ-role is not.

Summarizing the discussions so far, English has three types of resultatives. Unergative-based resultatives and the transitive-based resultatives have result phrases followed by post-verbal NPs. The difference between the two resultatives is that in the unergative-based resultatives there is a syntactic operation "Result Raising," and the unergative verbs are turned into case-assigners taking post-verbal NPs, while transitive-based resultatives do not have such special syntactic operation. Unaccusative-based and Passive-based resultatives have the raising operation of internal arguments to the Spec-TP and do not take post-verbal NPs because of the intervention effect called DIC. In the unaccusative case, the argument is shared by more than one predicate and the semantic link is guaranteed by argument sharing. All these phenomena are syntactic operations, so we can say that at least some argument selections of verbs must be determined syntactically. In the following section, I will discuss argument sharing and semantic link in Edo and conclude that the analysis in this section is adequate.

4 SERIAL VERB CONSTRUCTIONS (SVCS) IN EDO

It is suggested in Stewart (1998) that some West African languages such as Edo, Ewe, Yoruba and others have a syntactically peculiar structure called "serial verb constructions (SVCs)," which have more than one verb in a single sentence without any conjunction. I will discuss the resultatives of Edo expressed in SVCs. I suggest that the peculiarity of resultatives in this language can be comprehended if we assume the argument sharing analysis discussed in the previous section.

Resultatives in Edo are expressed in SVCs. The first verb in resultatives is a transitive verb and the second verb must be an intransitive verb. In addition, the second verb must be of the unaccusative class, not the unergative class as shown below:

(20) a. Òzó suá Úyì dé.
Ozo push Uyi fall
'Ozo pushed Uyi, causing him to fall.'

b. Ékítà khú áhiánmwèn làdián.
dog chase bird exit
'The dog chased a bird away (causing it to leave).'

(21) a. *Òzó suá Úyì só.
Ozo push Uyi shout
'Ozo pushed Uyi, causing him to shout.'

b. *Ékítà khú áhiánmwèn tín.
dog chase bird fly

'The dog chased a bird, causing it to fly.'

(Baker and Stewart 1999: 17)

The unacceptability of the examples in (21) is caused by a structural reason, because as shown in the English glosses, there is no semantic problem in these examples. We can easily imagine a situation illustrated in these English sentences. Baker and Stewart (1998) analyze these examples by suggesting the double-headed phrase structure shown below:

(22) $[_{TP}\ [_{DP}\ Ozo]_i\ [_{T}\ will][_{Voice\ P}\ t_i\ [_{vP}\ [v\ push]_j\ [_{VP}\ Uyi\ [_{V}\ t_j][_{V}\ fall]]]]]$

However, this double-headed phrase structure has a serious conceptual problem. From the principles and parameters' exploration, phrase structure is thought to be composed of the single headed structure. In the Bare Phrase system, the fundamental syntactic operation Merge can combine two syntactic objects to form a new syntactic object. The new object is a set of the two objects and has the syntactic label calculated from the labels of the two components. The new object can participate in the next syntactic calculation, and this cyclicity assures the discrete infinity of language. Therefore, it is more desirable to explore the single-headed phrase structure at least in the present framework.

According to Baker and Stewart (1999), there are three advantages over the single-headed analysis for the double-headed phrase structure. First, there is a semantic link between the matrix transitive verb and the unaccusative verb in the result phrase. The result state is caused by the action or the process denoted by the matrix verb. Second, unergative verbs cannot be used as the matrix verb in resultatives:

(23) * Ékítà gbòó Àdésúwà rhió!rré.
dog bark Adesuwa wake up
'The dog barked Adesuwa awake.'

(Baker and Stewart 1999: 26)

If the double-headed phrase structure is assumed, this fact can be captured because Baker and Stewart (1999) suggest that SVCs have two heads of the same type forming the double-headed complement of a single higher head. Thus when the matrix verb is unergative, it will be incompatible with second unaccusative verb's type. Finally, they argue for the existence of resultatives with two unaccusative verbs supporting the double-headed analysis:

(24) a. Ébólù wèrrié (*gié!gié) làdián
ball roll quickly exit
'The ball rolled (*quickly) out.'
b. Òmó dé (*gié!gié) wú.
child fall quickly die

'The child fell and (*quickly) died.'

(Baker and Stewart 1999: 27)

These examples can be easily grasped through the double-headed analysis. The subjects of these sentences are shared theme arguments of the two unaccusative verbs. In other respects, these resultatives have the same syntactic properties as other resultatives. For example, the N-adverb gié!gié cannot modify simply the second unaccusative in resultatives on its own. N-adverbs are thought to be right-adjoined to a maximal VP, and the resultative structure under the double-headed analysis does not have room between the object and the second verb for the N-adverb to appear. Thus the double-headed phrase structure explains the property of unaccusative-unaccusative type resultatives. Needless to say, N-adverb cannot be inserted between the object and the second verb in Transitive-unaccusative resultatives.

(25) * Òzó suá àkhé ègìégìé/ vbè òwá dé
Ozo push pot quickly/ in house fall
'Ozo pushed the pot quickly/in the house down.'

(Baker and Stewart 1999: 23)

However, these problems can be solved under the single-headed phrase structure, if we assume the argument sharing discussed in the previous section. I suggest that in Edo resultatives the small *v* in *v*P can take VP as its complement, and the two verbs can be inserted independently, the main verb in v and the second unaccusative in V. The derivation of the transitive-unaccusative resultatives in (20a) is shown below:

(26) $[_{TP}$ Ozo $[_{vP}$ push $[_{V}$ fall$]_i$ $[_{VP}$ Uyi t_i]]]

In this derivation the V *fall* covertly raises to the *v* position to incorporate into the *v* *push*. There is no structural hierarchy between the NP *Uyi* and the V *fall*, because they both are in VP and neither of them asymmetrically c-command the other. Thus the raising operation does not conflict with the head-movement constraint and the *v*-V complex constitutes *v*P projection at LF by this incorporation. The crucial difference between English and Edo is that in Edo the element in *v* and the element in V can be independently inserted, while in English the element in v is always empty, and the V needs to raise to v. The NP *Uyi* base-generates in the second unaccusative verb, and then is assigned two θ-roles from the *v*-V complex. Thus the argument *Uyi* is shared by both the second unaccusative verb *fall* and the matrix verb *push* to constitute a semantic link. This semantic link is interpreted at LF, and produces resultative reading. The first problem in the semantic relation can be grasped by this semantic link through argument sharing.

As for the second problem, I simply stipulate the generalization on the argument sharing in Edo resultatives as shown in (27):

(27) Internal argument sharing in SVCs
In a serial verb construction, V_1 and V_2 must share an internal argument.

This generalization is suggested in Foley and Olson (1985), Baker (1989), and Collins (1997), and can be observed in the examples in (21) and (23) with unergative verbs, which do not have any internal argument. In addition, the shared argument in transitive-unaccusative resultatives is the complement of the matrix transitive verb. The second problem conforms to this generalization, though I will not consider the deduction of this generalization to the more general principle because it is beyond the scope of this paper.[5]

Finally, I discuss the placement of adverbs, which is the basis for the double-headed analysis. N-adverbs can right-adjoin to the VP, but in resultatives, N-adverbs can only be understood as modifying both the matrix verb and the second unaccusative, but cannot modify only the second unaccusative verb. As suggested, the theme argument in resultatives is shared by the *v*-V compounds. The V-raising broadens the projection from VP to *v*P to form the single *v*P projection, and the NP *Uyi* in (26) constitutes the semantic link by argument sharing via the two predicates. Thus if N-adverbs are inserted between the *v*P and VP, the NP *Uyi* cannot constitute a semantic link, because N-adverbs induce a kind of intervention effect. Thus N-adverbs can modify the whole *v*P in (26), but not simply VP. Therefore, the objections against single-headed phrase structure suggested by Baker and Stewart (1999) can be overcome. Therefore, we can say that the single-headed analysis is attainable, because the double-headed structure is conceptually problematic and should be avoided if possible.

Is there any evidence that the theme argument in resultatives is shared by more than one predicate? The answer is positive and the evidence is presented by Baker and Stewart (1999) by using the distribution of *tobore* 'by onself.' *Tobore* can be right-adjoined to NPs, and in the consequential serial verb constructions (CSVCs) *tobore* can follow the second unaccusative, while in resultatives it cannot adjoin to the second predicate as shown below:

(28) a. Òzó dé ìyánk dùnmúwn (--) tòbórèk
Ozo buy yam pound by self
'Ozo bought the yam and pounded it by itself.'

b. *Òzó sùá ògók dé (--) tòbórèk
Ozo push bottle fall -- by self
'Ozo push bottle fall – by self.'

(Baker and Stewart 1999: 29)

The CSVCs' example in (28a) implies the existence of some phonologically null pronoun in the second predicate, and *tobore* can modify the empty pronoun. On the other hand, in resultatives there is no such covert pronoun, and there is no appropriate position for *tobore* to appear in (28b). As I have suggested, the theme argument is shared by the two predicates, and this contrast illuminates the existence of argument sharing.

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[5] I assume the external argument does not get a θ-role in its base-position. It must be given a θ-role in the Spec-TP, and if the argument of the second unergative verb in SVCs is raised to Spec-TP, it cannot get a θ-role because of some locality condition.

5 CONCLUSION AND FINAL REMARKS

In this paper, I have discussed argument sharing in English resultatives and Edo resultatives. By hypothesizing the semantic link through argument sharing, the peculiar nature of these examples can be grasped. In transitive-based resultatives in English, the semantic relation between the matrix verb and the result phrase is indirectly constituted, so both the resultative reading and the depictive reading can be captured. In unergative-based resultatives in English, there is a syntactic operation, which I call 'Result Raising,' and this raising operation changes an unergative verb, not a case-assigner, to a transitive verb status, so an unergative verb behaves as if it were a transitive verb in resultatives in English. In unaccusative-based resultatives in English, the argument is directly shared by the matrix verb and the result phrase, which composes the resultative reading by argument sharing. In addition, following the Unaccusative Hypothesis, it can be expected that unaccusative verbs do not take post-verbal NPs even in resultatives. This fact can be comprehended by assuming DIC, and if this analysis is on the right track, we can say that the argument selection of verbs in English must be determined in the syntax, and we must pay attention to the possibility that the lexical formational operation should be handed over to the realm of syntax.

In Edo resultatives, argument sharing phenomenon is directly observed, and by assuming argument sharing, we can treat resultatives in Edo within the single-headed phrase structure, which is agreeable from the conceptual point of view.

Collins (1997) discusses the resultatives in Ewe by suggesting the presence of empty categories in the subject of the second verb. This suggestion is based on the existence of the postposition *yi*, which can optionally assign case to the NP without case from other case-assigners. His discussion focuses on the nature of this empty category, and his suggestion is that the empty category is pro, not PRO or the trace of A- or A'-movement. If his analysis is on the right track, it can be predicted again that Ewe, which Baker (1989) analyzes by suggesting the double-headed phrase structure, can be grasped through the single-headed phrase structure. Why then do Ewe resultatives have null elements in the second verb? As is discussed in this paper, in Edo resultatives there is no such null pronoun, and I propose the argument sharing of the theme argument. In fact, this contrast can be found in English resultatives. In section 3 of this paper, I suggested that PRO exists in the result phrase in the transitive-based resultatives, while the theme argument is shared by the two predicates in the unergative-based resultatives. If the analysis in this paper is correct, these contrasts can be resolved in the near future, and I will leave them for future research.

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